U.S. Climate Change Policy, Price Volatility and U.S. Competitiveness

By

Margo Thorning, Ph.D.
Senior Vice President and Chief Economist
American Council for Capital Formation

Before the
Committee on Ways and Means
U.S. House of Representatives

March 26, 2009

Executive Summary

Climate Change Policy, the U.S. Economy and Competitiveness: Recent private and government analyses of the impact of cap and trade proposals such as the Lieberman-Warner bill (S.2191) which sets targets to reduce GHGs to 15 percent below 2005 levels by 2020 and to 70 percent below by 2050, show that there are likely to be significant adverse consequences for the U.S. economy and job growth. Higher energy prices slow economic growth. An ACCF/NAM study shows that GDP declines by as much as 1 percent in 2020 and by up to 2.7 percent in 2030. Total U.S. employment (net of new jobs created in green industries) declines by 1,210,000 to 1,800.000 jobs in 2020 and by as many as 4,100,000 in 2030, compared to the baseline forecast.

Climate Change Policy and Price Volatility: The ACCF/NAM analysis of the Lieberman/Warner bill shows significant energy price increases by 2030.The cost of electricity to the residential sector will rise by 101 to 129 percent by 2030, while the industrial natural gas price increase is projected to range between 180 and 244 percent. The effect of mandatory GHG reduction targets is to significantly increase the share of U.S. electricity generated by natural gas compared to the baseline forecast and industrial natural gas prices would rise by 180 to 244 percent by 2030.

Obama Administration Cli**mate Change Proposal: Impact on the U.S. Economy:** The climate change plan outlined in the Administration's FY 2010 budget sets a target of 14 percent below 2005 levels by 2020 and 83 percent below by 2050 with 100 percent auctioning from the beginning. The Administration appears to expect the price of a carbon allowance to be approximately $13 to $16 dollars per ton of CO2 and that its cap and trade proposal would yield $675 billion over the 2012-2019. Based on the various studies, the estimated payments to the Federal government for carbon permits seem far too low.

Environmental Impact of U.S. Climate Change Policy: As noted in the new *Council of Economic Adviser's Report to the President,* U.S. policies to reduce GHGs will have virtually no environmental benefits unless developing countries, whose emissions are growing strongly, also participate. The CEA report states that global concentrations of

CO2 in 2100 will be almost unaffected by U.S. emission reductions unless developing countries participate. Thus, sacrificing U.S. economic and job growth through unilateral climate change policies would yield little environmental benefit.

Conclusion: To be effective, policies to reduce global GHG emission growth must include both developed and developing countries. Polices that enhance technology development and transfer are likely to be more widely accepted than those that require sharp, near term reductions in per capita energy use.

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Introduction

Mr. Chairman and members of the Committee on Ways and Means, my name is Margo Thorning, senior vice president and chief economist, American Council for Capital Formation (ACCF),* Washington, D.C. I am pleased to present this testimony to the Committee.

The American Council for Capital Formation represents a broad cross-section of the American business community, including the manufacturing and financial sectors, Fortune 500 companies and smaller firms, investors, and associations from all sectors of the economy. Our distinguished board of directors includes cabinet members of prior Democratic and Republican administrations, former members of Congress, prominent business leaders, and public finance and environmental policy experts. The ACCF is celebrating over 30 years of leadership in advocating tax, regulatory, environmental, and trade policies to increase U.S. economic growth and environmental quality.

Chairman Rangel, Ranking Member Camp, and the Members of the House Ways and Means Committee are to be commended for their focus on the question of how the volatility of the price of carbon allowance permits could affect the U.S. economy and job growth. Given the extremely weak state of the U.S. economy, a cautious approach to reducing greenhouse gas emission growth is clearly warranted. The questions we need to ask are first, what are the likely impacts of cap and trade or carbon tax legislation on the U.S economy, job growth and competitiveness and second, what are the economic and environmental impacts of the U.S. proceeding with climate policy legislation without the participation of our trading partners in the developing world? My testimony will address these key issues.

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* *The mission of the American Council for Capital Formation is to promote economic growth through sound tax, environmental, and trade policies. For more information about the Council or for copies of this testimony, please contact the ACCF, 1750 K Street, N.W., Suite 400, Washington, D.C. 20006-2302; telephone: 202.293.5811; fax: 202.785.8165; e-mail: info@accf.org; website: www.accf.org*

I. Impact of Climate Change Policy on the U.S. Economy, Energy Prices and Competitiveness

- **Impact on U.S. GDP and Employment**

Recent private and government analyses of the impact of cap and trade proposals such as the Lieberman-Warner bill (S.2191), which sets targets to reduce GHGs to 15 percent below 2005 levels by 2020 and to 70 percent below by 2050, show that there are likely to be significant adverse consequences for the U.S. economy and job growth. **(See Table 1)**. For example, an analysis by the American Council for Capital Formation and the National Association of Manufacturers of S.2191 showed that by 2020, the cost of an emission allowance that industry would need to purchase that year for each ton of CO2 emitted would range from $55 to $64 dollars (see study at http://www.accf.org/pdf/NAM/fullstudy031208.pdf).

Results of other modeling efforts from CRA International, DOE's Energy Information Administration, the U.S. Environmental Protection Agency and the Massachusetts Institute of Technology show a similar range of allowance prices, especially when the availability of carbon capture and storage and new nuclear generation capacity are constrained **(see Table 1)**. By 2030, carbon allowance prices are higher due to the tightening of emission reduction targets, increased demand and U.S. population growth.

Higher energy prices slow economic growth. The ACCF/NAM study shows that GDP declines by as much as 1 percent in 2020 and by up to 2.7 percent in 2030. GDP losses in the other studies reported in **Table 1** show losses of up to 1.5 percent in 2020 and 2.3 percent in 2030.

The ACCF/NAM analysis shows that the drag of higher energy prices caused by the cap and trade system in S.2191 reduces total U.S. employment (net of new jobs created in green industries) by 1,210,000 to 1,800,000 jobs in 2020 and by as many as 4,100,000 in 2030, compared to the baseline forecast. In other analyses cited in **Table 1**, job losses range from 270,000 to 3,269,000 in 2020 and up to 2,393,000 by 2030.

- **Impact on Household and Industrial Energy Prices**

The ACCF/NAM analysis of the Lieberman/Warner bill shows significant energy price increases by 2030, primarily due to the impact of the cost of purchasing carbon permits but also from the construction and operation of a more costly suite of energy conversion technologies that help satisfy emission limits. As shown in **Table 2**, a revamped power generation sector is projected to increase the cost of electricity to the residential sector between 101 (Low Cost case) and 129 percent (High Cost case) by 2030, while the industrial natural gas price increase is projected to range between 180 (Low Cost case) to 244 percent (High Cost case). The effect of mandatory GHG reduction targets is to significantly increase the share of U.S. electricity generated by natural gas compared to the baseline forecast. By 2020, thirty percent more of the U.S. electricity supply would be generated by natural gas, and over 100 percent more by 2030 (see **Figure 1**).

In constant 2007 dollars, most energy prices are projected to increase under S. 2191, particularly, coal, oil, and natural gas, directly reflecting the impact of increasing CO_2

allowance prices. The price of gasoline would increase between 13 and 50 percent in 2014 and by 20 to 69 percent by 2020. For example, motorists would pay an additional $0.28 to $1.07 dollars per gallon in 2014 and an additional $0.43 to $1.46 per gallon by 2020. Heating oil prices in the Northeast would increase by 19 to 60 percent by 2014, by 28 to 81 percent by 2020, and by 104 to 178 percent by 2030. Residential natural gas price increases range between 108 to 146 percent in 2030 (see Table 1 of full report at http://www.accf.org/media/dynamic/1/media_190.pdf)

II. Obama Administration Climate Change Proposal: Impact on the U.S. Economy

- **Administration Revenue Estimates**

The climate change plan outlined in the Administration's FY 2010 budget sets a target of 14 percent below 2005 levels by 2020 and 83 percent below by 2050 with 100 percent auctioning from the beginning. The magnitude of the effort is shown in **Figure 2.** By 2020, CO2 emissions will have declined by over 1 billion tons and by 2030 the gap is approximately 3.5 billion tons (see **Figure 2**). Required reductions in per capita emissions will mean large changes in consumer behavior and in business practices. Currently, the average U.S. citizen is responsible for about 23 tons of CO2 per year. Under the Obama Administration proposal per capita emissions would have to fall to 18 tons in 2020 and 12 tons per capita by 2030 (See **Figure 3**). Such large, rapid changes in emissions would mean sharp cutbacks in energy use by households and business and significant changes in consumption patterns.

The Administration appears to expect that the price of a carbon allowance will be approximately $13 to $16 dollars per ton of CO2 and that its cap and trade proposal would yield $675 billion over the 2012-2019 period. Based on the various studies cited above, the estimated payments to the Federal government for carbon permits seem far too low. In fact, the Administration's FY 2010 budget, "*A New Era of Responsibility, Renewing America's Promis,"* appears to recognize that carbon auction revenues could exceed the projected $80 billion per year. Footnote 5 on page 129 of the Administration's budget states, in reference to the proceeds from the auctioning of carbon allowances that "All additional net proceeds will be used to further compensate the public."

Based on DOE-EIA analysis, a comparison of the revenues that would have been generated under the Lieberman/Warner bill (S.2191), if all allowances were auctioned further supports the idea that the Administration's revenue estimates are significantly understated. As shown in **Figure 4**, if all allowances were auctioned under Lieberman/ Warner, total revenues to the government would have ranged from $1,200 billion to $3,000 billion over the 2012-2019 period. (See bars with hash marks). Adjusting the Lieberman-Warner data for the fact that the Obama Administration target is less stringent in the early years than the L/W target shows that even under EIA's core case, which assumes carbon capture and storage (CCS) is available, rapid expansion of new nuclear generation capacity, large use of domestic and international offsets, etc. shows that government revenues would exceed those estimated by the Administration (red bars). Using EIA's more realistic cases, where costs are higher, CCS is not readily available and nuclear generation capacity does not expand rapidly, shows that government revenues

from the carbon auction would be double or triple the $675 billion revenue estimate for 2012-2019 in the Administration's budget.

- **Energy Prices and U.S. Growth and Competitiveness**

The importance of getting the estimates of auction revenue (or carbon trading allowance proceeds) right from any climate change proposal is that higher energy prices will make it harder to restart U.S. economic and job growth. Each one percent increase in U.S. GDP growth is accompanied by a 0.3 percent increase in energy use: therefore, the higher the price of energy, the slower the rate of economic recovery. Adjusting to a cap on emissions is costly because the U.S. capital stock is long-lived and sharply higher energy prices render it prematurely obsolete. As a result, productivity growth slows along with GDP, jobs and household income.

A real world example of the effect that increased energy prices have on U.S. industry and employment can be observed by examining trends in the U.S. chemical industry. For example, chlorine is an essential chemical building block used in the production of pharmaceuticals, medical devices, safety equipment, computers, automobiles, aircraft parts and crop protection chemicals. Chlorine production is based on electro-chemistry and is one of the most energy-intensive production processes. In recent years, U.S. chlorine capacity has been shut down because of record high electricity costs arising from high natural gas prices, according to the American Chemistry Council. In addition, a report by SRI Consulting indicates that ammonia capacity fell from 14.8 million tons in 1999 to 13.6 million tons in 2007, an 8 percent reduction. Data on global natural gas prices for the third quarter of 2008 show that U.S. producers face much higher prices than many other countries, thus it is not surprising that much chemical production has migrated to lower cost locations.

Similarly, nitrogenous fertilizers play a major role in boosting crop yields and ammonia is the key raw material for these fertilizers. Ammonia production has also been affected by sharply rising natural gas prices. According to The Fertilizer Institute, from 1999-2007, 25 ammonia plants have been closed and a report by SRI Consulting indicates that ammonia capacity fell from 15.5 million metric tons in 1999 to 9.8 million metric tons in 2003, a 37 percent reduction. Approximately 120,000 jobs have been lost in the U.S. chemical industry since 1999, when natural gas prices began their sharp rise, according to the American Chemistry Council.

III. Role of Green Jobs in Promoting U.S. Economic Growth

Several recent studies suggest that by imposing mandatory GHG reductions on the U.S. economy, mandating renewable portfolio standards for electricity generation, requiring more use of renewable fuels, tightening CAFÉ and other efficiency standards, we would experience higher levels of economic and job growth compared to the baseline forecast. However, a substantial body of research suggests that the opposite is true. For example, the ACCF/NAM analysis of the Lieberman/Warner bill showed that even thought the legislation would have produced additional "green" jobs by increased spending on renewable energy, energy efficiency and carbon capture and storage, the U.S. would still lose a net 1.2 to 1.8 million jobs in 2020 and 3.0 to 4.0 jobs in 2030 (see study at

http://www.accf.org/media/dynamic/1/media_190.pdf) due to higher energy prices and slower productivity growth.

A recent careful analysis of the impact of government mandates, subsidies and forced technological innovation for renewable energy and energy efficiency released by the University of Illinois College of Law, *7 Myths About Green Jobs* concludes that the special interests promoting the idea of green jobs have embedded dubious assumptions and techniques in their analyses. The University of Illinois report notes that the fundamental flaws in the studies promoting green jobs as a means of U.S. economic recovery are: (1) lack of standard definition of green jobs, and (2) fundamental errors in economic analysis such as rejecting the importance of comparative advantage, suggesting the need to avoid international trade (see University of Illinois report at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1357440).

IV. Economic and Environmental Impact of Strategies to Reduce Global and U.S. GHG Emission Growth

Climate change is a global issue which cannot be solved unless all major countries, including developing countries, curb their GHG emissions. As they approach this issue, policymakers, the media and the public need to understand the relative role of U.S. emissions, the E.U. experience with mandatory GHG reduction targets and the possible impacts on energy price volatility caused by the adoption of a cap and trade system to limit GHG emissions.

- **Global CO2 Emission growth and the Economic and Environmental Impact of Mandatory U.S. GHG Emission Reductions**

Most of the growth in CO2 emissions in the 21st century will be in the developing world (see **Figure 5).** As described above, meeting the mandatory reduction targets of proposed legislation such as the Lieberman/ Warner bill or the Obama Administration proposal are likely to have a significant impact on U.S. economic and job growth due to the sharply higher energy prices needed to bring down emissions. However, the U.S. climate change policies will have virtually no environmental benefits unless developing countries, whose emissions are growing strongly also participate. As noted in the new 2009 *Council of Economic Adviser's Report to the President*, global concentrations of CO2 in 2100 will be almost unaffected by U.S. emission reductions (See **Figure 6**). Thus, without strong international participation to reduce GHGs, the slower U.S. economic and job growth that would result from the emission reduction targets being debated by U.S. policymakers would yield little environmental benefit.

- **Impact of the European Union's Emission Trading System**

As we attempt to choose cost effective climate change policies for the U.S., it is useful to examine the cost-effectiveness of current policies to reduce GHG emissions in developed countries. In the European Union, reduction of GHGs has become a major policy goal and billions of Euros, from both the private and the public sector, have been spent on this policy objective. Many policymakers, the media and the public believe that the European Union's Emission Trading System (ETS) has produced reductions in GHG emissions and that their system could serve as a model for the U.S. The ETS, created in 2005, is a

market-based, EU-wide system that allows countries to "trade" (i.e., buy and sell) permits to emit CO_2. The ETS covers about 11,500 installations and almost half of the EU's GHG emissions.

The EU 15 (the major industrial countries) has a Kyoto Protocol target of an 8 percent reduction below 1990 levels in GHGs by 2010-2012. The European Environmental Agency's latest projections (October 2008) show that without strong new measures, EU 15 emissions will be almost 5 percent above 1990 levels in 2010, rather than 8 percent below as required by the Kyoto Protocol (**see Figure 7). G**iven the challenges of meeting the Kyoto Protocol target, it seems unlikely that the EU will be able to meet its new 2020 GHG reduction goals of a 20 to 30 percent reduction in emissions and a 20 percent of energy use from renewables by 2020 (see http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/08/34 for details). EU member state politicians would face significant opposition to increases in energy prices and taxes sufficient to meet the stringent new emission and renewable targets.

- **Energy Price Volatility under a Cap and Trade System Compared to a Carbon Tax**

Two initiatives, a cap and trade approach and a tax on carbon emissions are currently receiving support from policymakers. A cap and trade system puts an absolute restriction on the quantity of emissions allowed (i.e., the cap) and allows the price of emissions to adjust to the marginal abatement cost (i.e., the cost of controlling a unit of emissions). A carbon tax, in contrast, sets a price for a ton of emissions and allows the quantity of emissions to adjust to the level at which marginal abatement cost is equal to the level of the tax. While neither approach, if adopted by the U.S. would have a meaningful impact in slowing the growth of global greenhouse gas emissions, the carbon tax approach is likely to cause less volatility in energy prices than would a cap and trade system.

Price volatility for a permit to emit CO_2 can arise under a cap and trade program because the supply of permits is fixed by the government, but the demand for permits may vary considerably year to year with changes in fuel prices and the demand for energy. As mentioned above, price volatility for energy has negative impacts on economic growth. In contrast, a carbon tax fixes the price of CO_2, allowing the amount of emissions to vary with prevailing economic conditions. A carbon tax, as a system of inducing emissions reductions, is not without drawbacks. First, revenues from a CO_2 tax (or auctioned permits) might end up being wasted; for example, if the revenue went toward special interests, rather than substituting for other taxes. Second, progress on emissions reductions is uncertain under a CO_2 tax because emissions vary from year to year with economic conditions. However, a CO2 tax could be adjusted gradually upward if the desired reductions in emissions were not occurring.

V. Conclusion

To be effective, policies to reduce global GHG emission growth must include both developed and developing countries. Policies that enhance technology development and transfer are likely to be more widely accepted than those that require sharp, near term reductions in per capita energy use. Extending the framework of the Asia Pacific

Partnership on Clean Development and Climate and other international partnerships will allow developed countries to focus their efforts where they will get the largest return, in terms of emission reductions for the least cost.

Table 1. Economic Impact of the Lieberman-Warner Bill: Summary of Key Modeling Results			
	2020		
	Allowance Prices (2007$ per metric ton)	GDP Impact (% Change from BAU)	Impact on Jobs (%Change from BAU)
ACCF/NAM-Low Cost[1]	$55	-0.8%	-1,210,000
ACCF/NAM-High Cost[1]	$64	-1.1%	-1,800,000
CRA/NMA[2]	$47	-1.2%	-3,269,000
EIA- NEMS Core Case[3]	$31	-0.3%	-270,000
EIA- NEMS Limited[3]	$44	-0.5%	-450,000
EPA- Scenario 2[4]	$39	-0.7%	-
EPA- Scenario 7[4]	$73	-1.5%	-
MIT- No Offsets, No CCS Subsidy[5]	$72	-0.7%	-
MIT- 15%, CCS Subsidy[5]	$61	-0.8%	-

	2030		
	Allowance Prices (2007$ per metric ton)	GDP (% Change) (% Change from BAU)	Impact on Jobs (%Change from BAU)
ACCF/NAM-Low Cost[1]	$228	-2.6%	-3,100,000
ACCF/NAM-High Cost[1]	$271	-2.7%	-4,100,000
CRA/NMA[2]	$68	-1.0%	-2,393,000
EIA- NEMS Core Case[3]	$62	-0.3%	-280,000
EIA- NEMS Limited[3]	$93	-0.7%	-710,000
EPA- Scenario 2[4]	$64	-0.9%	-
EPA- Scenario 7[4]	$118	-2.3%	-
MIT- No Offsets, No CCS Subsidy[5]	$105	-0.3%	-
MIT- 15%, CCS Subsidy[5]	$89	-0.4%	-

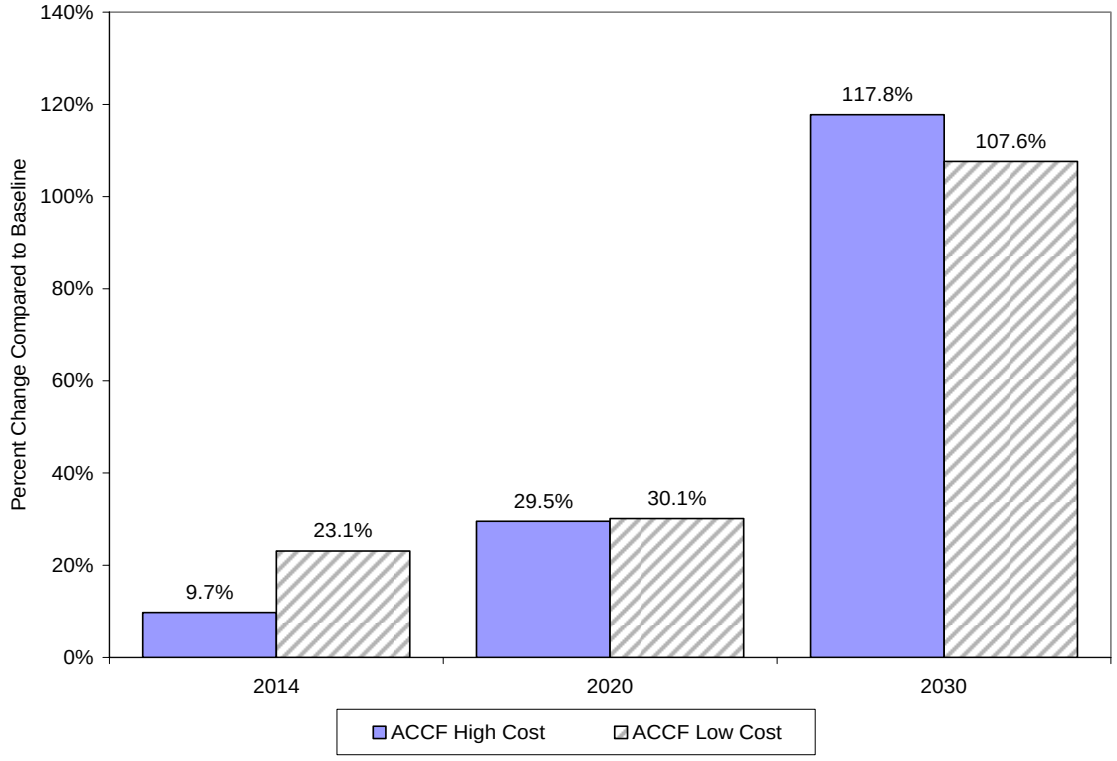
1. "Analysis of The Lieberman-Warner Climate Security Act (S.2191) Using The National Energy Modeling System
(NEMS/ACCF/NAM)," A Report by the American Council for Capital Formation and the National Association of Manufacturers, March 2008.
2. "Economic Analysis of the Lieberman-Warner Climate Security Act of 2007 Using CRA's MRN-NEEM Model," by CRA International, April 2008.
3. "Energy Market and Economic Impacts of S.2191, the Lieberman-Warner Climate Security Act of 2007," by the Energy Information Administration, U.S. Department of Energy, April 2008.
4. "EPA Analysis of the Lieberman-Warner Climate Security Act of 2007," by the U.S. Environmental Protection Agency, March 2008.
5. "Appendix D: Analysis of the Cap and Trade Features of the Lieberman-Warner Climate Security Act," by MIT.

Table 2. Impact of Lieberman-Warner Bill on the United States: Change in Energy Prices Compared to Baseline Forecast

	Low Cost Case			High Cost Case		
	2014	2020	2030	2014	2020	2030
Rise in Gasoline Prices	13%	20%	77%	50%	69%	145%
Rise in Residential Electricity Prices	13%	28%	101%	14%	33%	129%
Rise in Industrial Electricity Prices	22%	41%	142%	23%	49%	185%
Rise in Industrial Natural Gas Prices	36%	49%	180%	40%	66%	244%

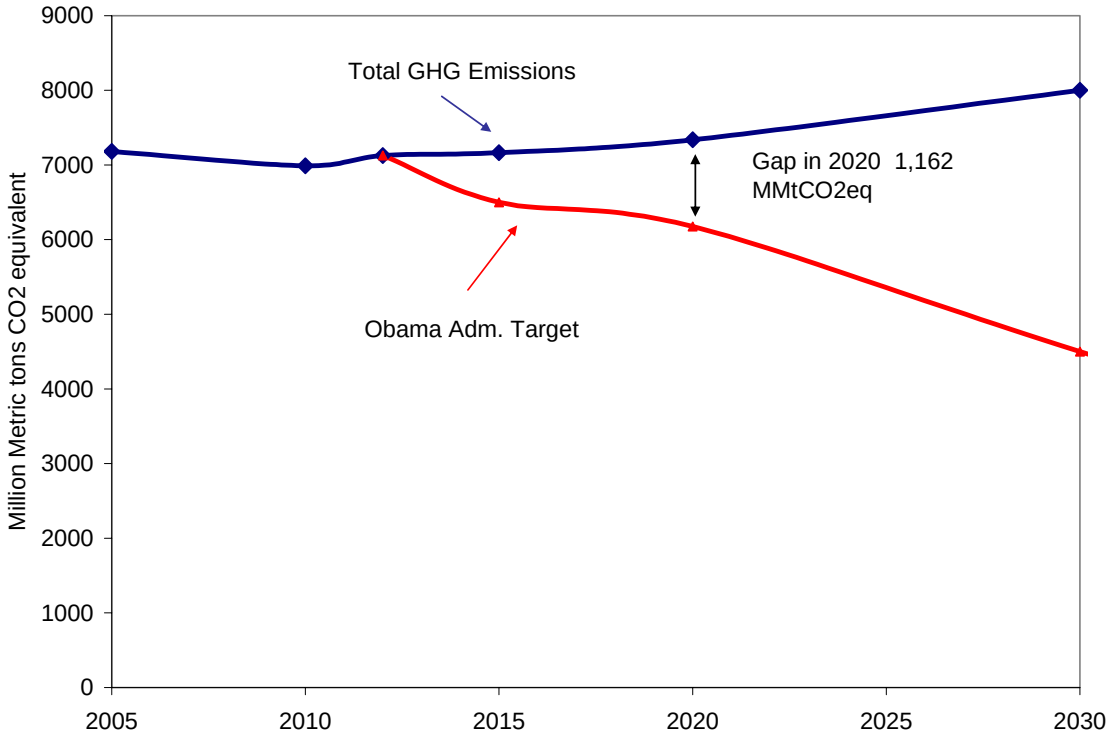
Source: "Analysis of The Lieberman-Warner Climate Security Act (S.2191) Using The National Energy Modeling System (NEMS/ACCF/NAM)," A Report by the American Council for Capital Formation and the National Association of Manufacturers, March 2008.

Figure 1. Change in Electricity Generated by Natural Gas under Lieberman-Warner Bill (S.2191) (Compared to Baseline Forecast)



Source: "Analysis of The Lieberman-Warner Climate Security Act (S.2191) Using The National Energy Modeling System (NEMS/ACCF/NAM)," A Report by the American Council for Capital Formation and the National Association of Manufacturers, March 2008.

Figure 2: Greenhouse Gas Emissions: Under EIA Baseline Forecast* and Obama Administration Proposal (Million Metric Tons CO2 Equivalent)**



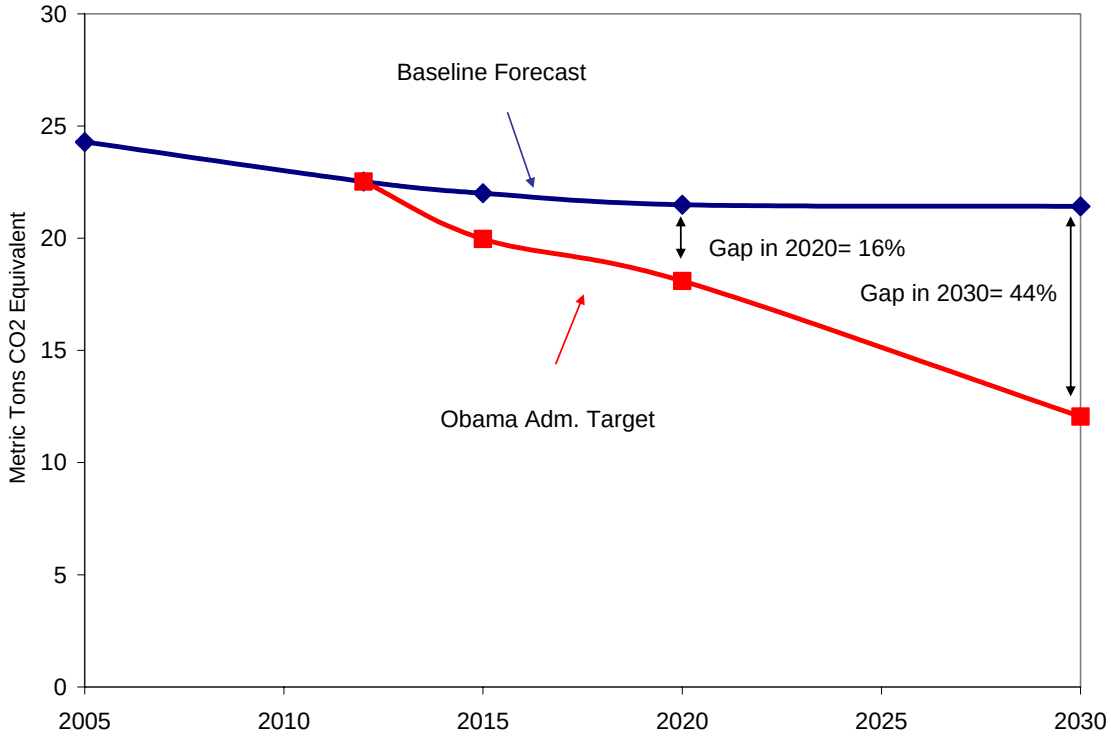
* Baseline forecast calculated by adding energy related CO2 emissions from Annual Energy Outlook 2009 and total other greenhouse gases as forecasted in EIA's S.2191 Analysis
** President Obama's budget proposal specifies a reduction of greenhouse gas emissions 14% below 2005 levels by 2020 and 83% below 2005 levels by 2050.

Sources: "Annual Energy Outlook 2009," Energy Information Administration, Department of Energy, Table 19, http://www.eia.doe.gov/oiaf/aeo/aeoref_tab.html

"Energy Market and Economic Impacts of S.2191, the Lieberman-Warner Climate Security Act of 2007," Energy Information Administration, Department of Energy, Reference Case, Table 20, http://www.eia.doe.gov/oiaf/servicerpt/s2191/excel/aeo2008.xls

"A New Era of Responsibility, Renewing America's Promise," Office of Management and Budget, pg 21, http://www.whitehouse.gov/omb/assets/fy2010_new_era/A_New_Era_of_Responsibility2.pdf

Figure 3: Per Capita Greenhouse Gas Emissions: Under EIA Baseline Forecast* and Obama Administration Proposal (Metric Tons CO2 Equivalent Per Person)**



* Baseline forecast calculated by adding energy related CO2 emissions from Annual Energy Outlook 2009 and total other greenhouse gases as forecasted in EIA's S.2191 Analysis and by dividing by population numbers from U.S. Census.
** President Obama's budget proposal specifies a reduction of greenhouse gas emissions 14% below 2005 levels by 2020 and 83% below 2005 levels by 2050.

Sources: "Annual Energy Outlook 2009," Energy Information Administration, Department of Energy, Table 19, http://www.eia.doe.gov/oiaf/aeo/aeoref_tab.html

"Energy Market and Economic Impacts of S.2191, the Lieberman-Warner Climate Security Act of 2007," Energy Information Administration, Department of Energy, Reference Case, Table 20, http://www.eia.doe.gov/oiaf/servicerpt/s2191/excel/aeo2008.xls

"National Population Projections," U.S. Census Bureau, http://www.census.gov/population/www/projections/files/nation/download/NP2008_D1.xls

"A New Era of Responsibility, Renewing America's Promise," Office of Management and Budget, pg 21, http://www.whitehouse.gov/omb/assets/fy2010_new_era/A_New_Era_of_Responsibility2.pdf

Figure 4: Obama Administration Climate Revenues (2012-2019) and EIA's Analysis of Lieberman/Warner (S.2191, assuming all allowanced auctioned) ($ in billions)

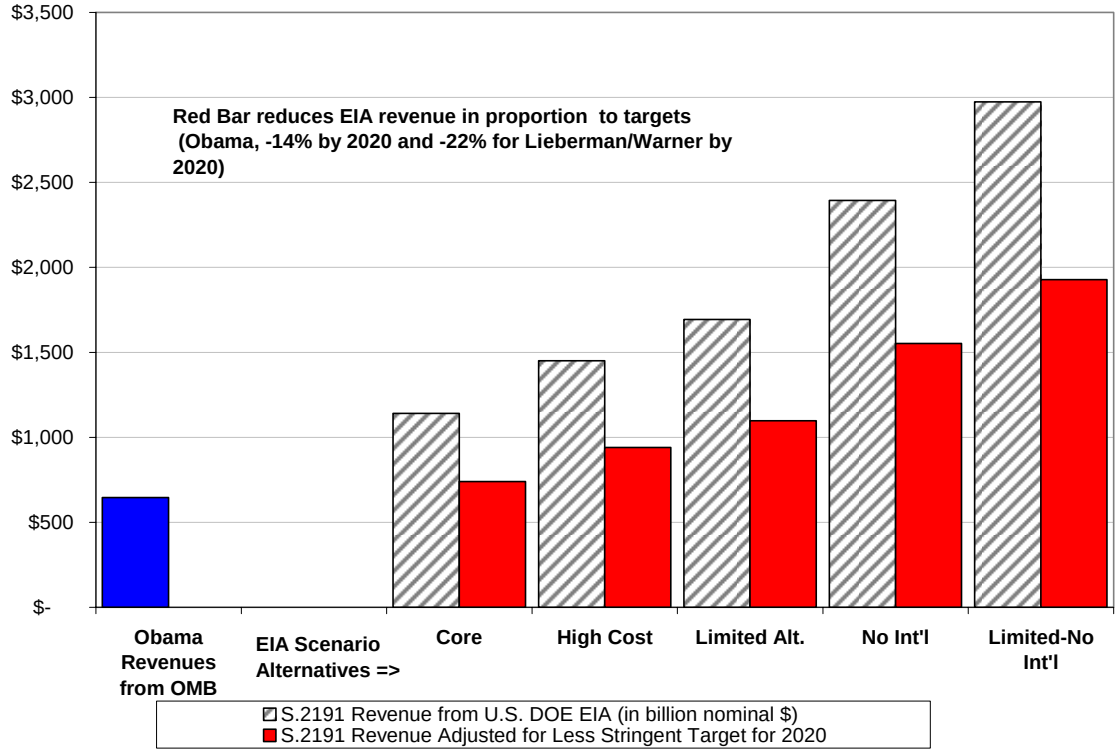
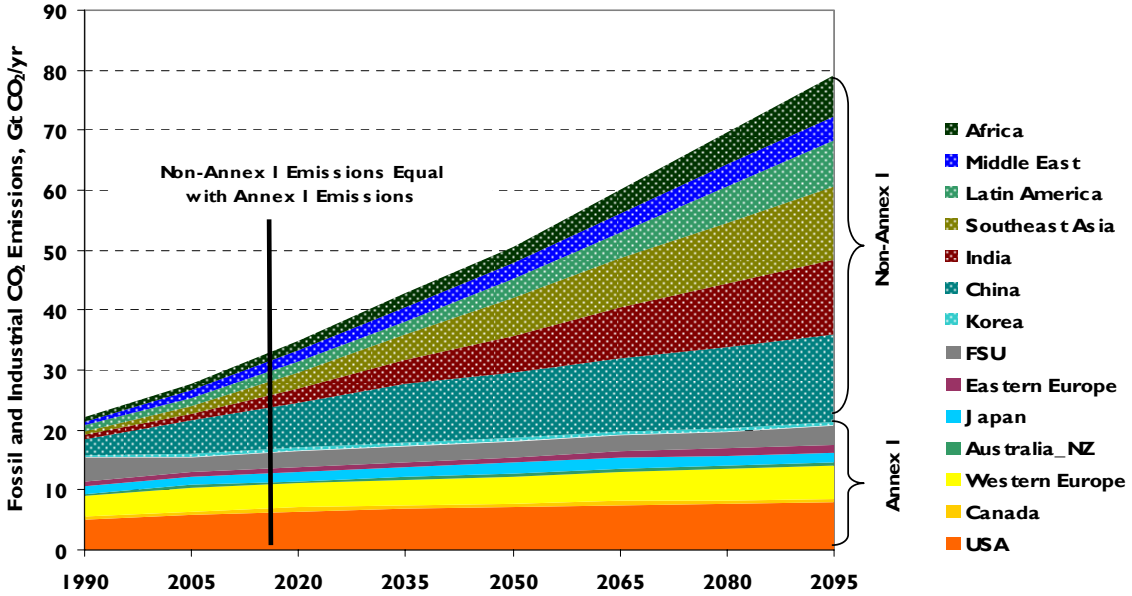
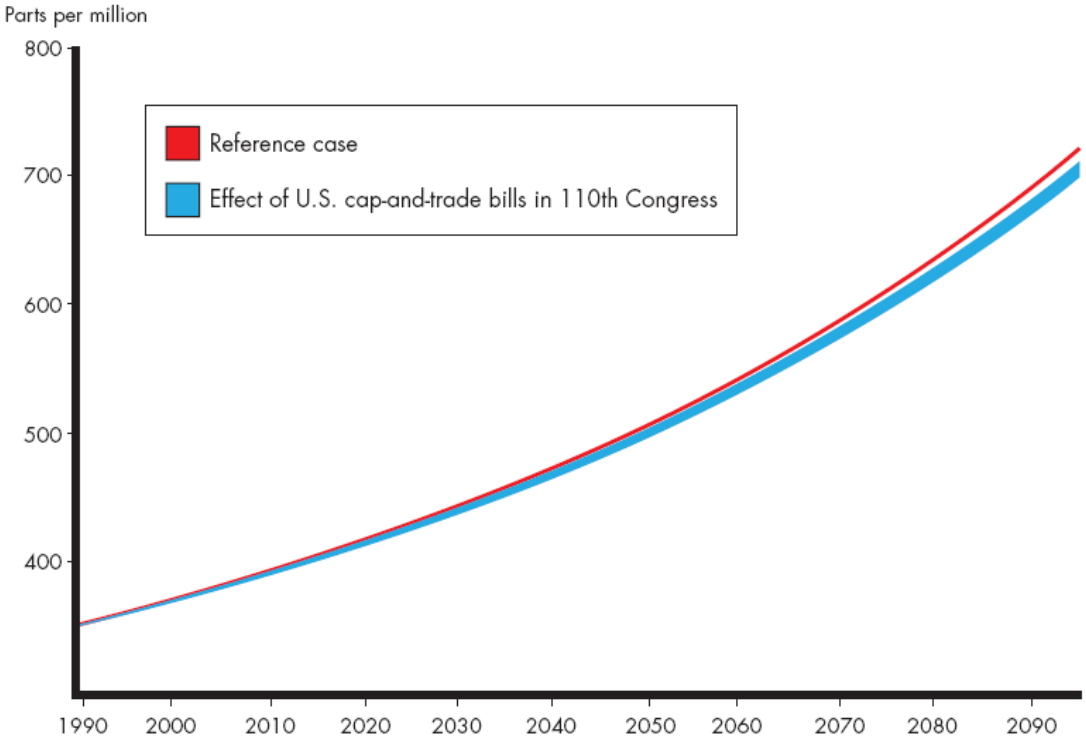


Figure 5. World Carbon Dioxide Emissions



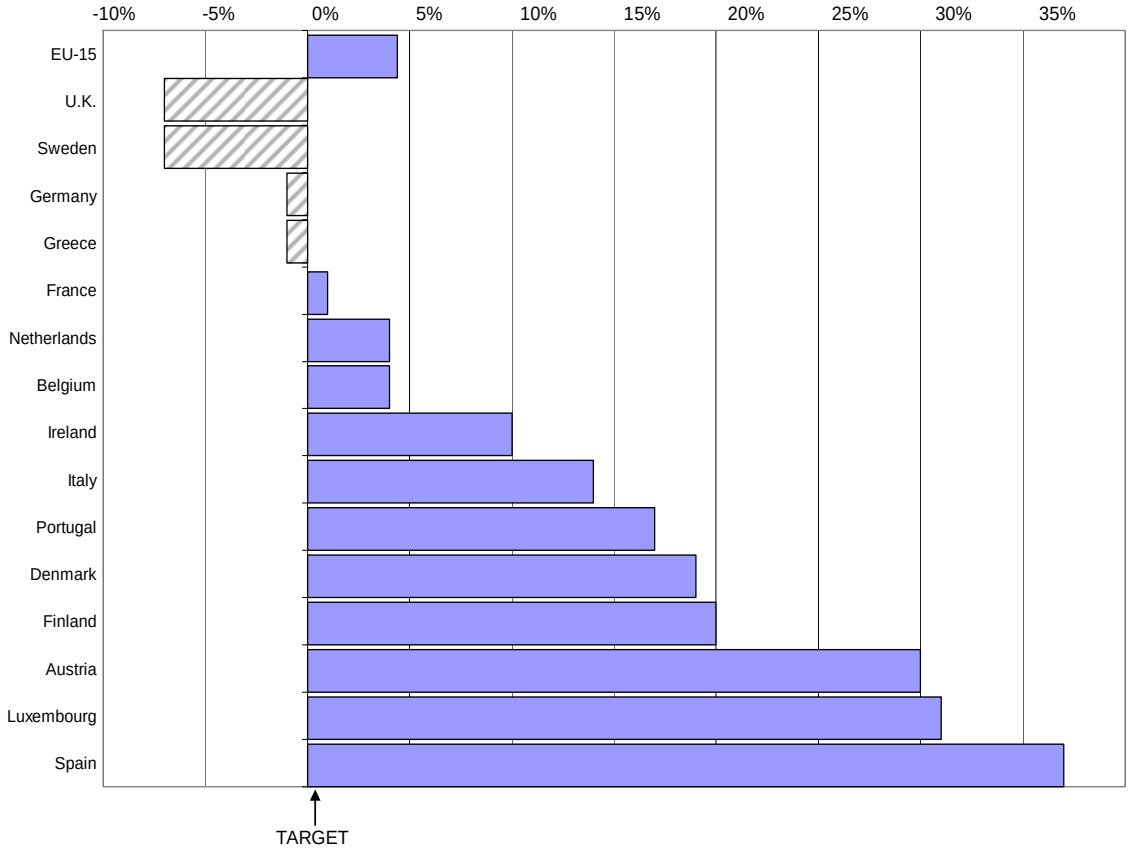
Source: Data derived from Global Energy Technology Strategy, Addressing Climate Change: Phase 2 Findings from an International Public-Private Sponsored Research Program, Battelle Memorial Institute, 2007.

Figure 6: Global CO2 Concentrations:
Carbon emissions are projected to rise over the next several decades



Source: Economic Report of the President, Annual Report of the Council of Economic Advisers, January 2009, Chart 3-6, pg 124.

Figure 7: Greenhouse Gas Emissions in the European Union: Gap between Projections* and Kyoto Targets in 2010



* Projections assume existing measures already in place.
Source: European Environmental Agency, October 2008.